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MINOR STUDIES FROM THE PSYCHOLOGICAL LABORATORY OF CORNELL UNIVERSITY

LIII. THE INVOLUNTARY RESPONSE TO PLEASANTNESS

By G. H. CORWIN

In a recent paper on *Pleasantness and Unpleasantness in Relation to Organic Response*, Young says:¹ "While U is associated with a large variety of reflex movements, P is passive and negative. Our data do not contain a single case of active reflex response to a P stimulus. With U there are withdrawing movements, frowning, straining, reflexes of expulsion, etc., while P is characterized by mere acceptance of the situation and the passive yielding to it. . . . Muscular strain (tension) is correlated with U, while its opposite, relaxation, is correlated with P.

"The traditional relation between P and seeking movements finds little support in our reports, while that between U and withdrawal is abundantly confirmed. The entire evidence for seeking movements, as 'expressions' of P, is found in 11 reports, in which the subject "sniffed," "took a deep breath in order to get more," "held the breath," etc. In every case these seeking movements are deliberate and never reflex, like most of the withdrawing movements of U. It is a question to what extent and in what sense voluntary deliberate behavior based upon the knowledge that P may be produced or prolonged, or U avoided, can be considered an 'expression of feeling.'"

This result, that the typical involuntary reaction to P is a relaxation and not a seeking movement, is contrary, as Young says, to psychological tradition; and it occurred to us that it might be occasioned by the method which Young employed. In fact, he himself implies that, under other conditions, another result might have been found. "It should be remembered that any result is a function of conditions. Our subjects were seated quietly in a Morris chair, instructed to be 'passive and receptive' and 'to let the experimental situation have its full normal effect.'" We have therefore undertaken in our experiment to put the O in a different situation. Instead of giving him a stimulus under conditions in which a seeking movement would be not only unnecessary but also impossible, and further instructing him to be 'passive and receptive,' we have tried to create a situation in which the O must seek if he desires to retain a P, and also to find an instruction under which he might move without disobeying it.

Our experiments fall into three series according to the stimuli used. We shall designate them as the olfactory, cutaneous and auditory experiments.

The Olfactory Experiment. The O's were seated in an ordinary chair in a room especially prepared for the experiment. To the right of the O a Ludwig kymograph was placed upon a table. This was concealed by a grey screen. The revolving drum had been removed, and a wooden rod 58 by 2.8 cm. was screwed to the center of the revolving disk. A clamp was fastened to the free end of the rod in

¹ P. T. Young, this JOURNAL, xxxii, 1921, 38ff.

such fashion that the stimulus-vials could be easily inserted and removed. By means of this apparatus a vial could be placed on the end of the rod directly under *O*'s nostrils; when the kymograph was set in motion, the stimulus would recede from him at the rate of 1.7 cm. per sec. A small electric fan, which served the double function of keeping the air in motion and of eliminating the noise of the kymograph, was operated during this experiment.

As a check upon *O*'s involuntary movements we took graphic records throughout this series. For this purpose a band was placed around *O*'s head and a cord extended to an ergograph which carried a pointer. By this arrangement any backward movement of the head was indicated upon the drum by a line in an upward, and any forward movement by a line in a downward direction.

The *O*'s were Assistant Professor L. B. Hoisington (H), Dr. H. G. Bishop (Bi), and Miss D. B. Dewey (D), a student taking her 'major' in psychology. Despite the fact that H and Bi worked with some knowledge of the problem, H assures us that his results are not influenced by knowledge, and that his reactions were entirely involuntary; whenever Bi suspected that knowledge might have influenced his results, he reported the fact. Every *O* worked two or three hours a week for periods of 40-60 min. The work was done during the spring of 1921. Five other (untrained) *O*'s were occasionally introduced into the experiment as a control. In every case we found positive results similar to, although not as extensive as, those reported by H, Bi, and D.

A preliminary series extending over two weeks was completed in order to determine the most effective stimuli and the best form of instruction. The following stimuli were employed: vanillin and cinnamon (3 to 1); Cashmere bouquet toilet water; whiskey; ol. rutae; carbon bisulphide; asafoetida; and empty vials. The instructions were: "You will be given a series of olfactory stimuli, some of which are *intensive* odors, some have no odors at all. At the signal 'now' smell the stimulus. You are asked (1) to report whether the immediate experience is pleasant, unpleasant or indifferent, and to indicate the *intensity of the feeling* (using, for example, such terms as 'very weak,' 'weak,' 'moderate,' 'strong,' 'very strong;') and (2) to report all muscular tendencies and organic sensations in any way related to the affective reaction."

From our preliminary series it had become evident that the very instruction 'to smell' might predispose the *O* to continue smelling, and might therefore occasion a pursuit for another reason than *P*. To offset this difficulty and also other predispositions, such as for example, curiosity, interest, the "laboratory attitude," etc., we introduced as stimuli several empty vials, and informed the *O* in the instruction that some of the stimuli would be *intensive* odors and some would have no odor at all. It turned out, however, that whenever an *O* actually moved or had a tendency to move from any of these extraneous motives, the fact was always reported in his introspections.

We give in Table I a summary of our results in quantitative form. It will be observed that for all *O*'s pursuit movements occurred in about one-half of the cases in which *P* was reported. Furthermore, for H and D, in addition to definite pursuit tendencies or movements, there was a much larger proportion of characteristic reactions which indicated their desire to prolong or 'get more of' the stimulus. H

reports organic stir with P in 17 cases; it is almost never found in the reports of Bi and D. These O's, however, were in 9 and 17 cases respectively actually seen by E to make gross pursuit movements.

TABLE I

Observer	H	Bi	D
Total No. Reports.....	73	46	60
Total No. Reports classified as P.....	36	26	42
No. of P reports characterized by definite seeking movements or tendencies to movement.....	15	13	18
No. of P reports characterized by secondary seeking movements, such as: sniffing, raising shoulders, change in breathing, extending arms, etc.....	34	11	28
No. of P reports with organic stir.....	17	0	5
No. of P reports with gross observed movement.....	0	9	17

Examples of the kind of introspection that we have classified in line 4 of the table (definite seeking movements) are:

D. "I felt attracted toward it and then repelled as it [the stimulus] became U." "Pushing of the shoulders and head forward." "Straining of the trunk upward." "Relaxing of my trunk towards the smell." "Moderately P, and I was inclined to follow it." "Tendency to go toward the stimulus not in a relaxed way but in a tense impulse." "I felt a tendency to move toward the stimulus."

Bi. "I felt a general pressure-kinaesthesia that would favor following up the odor, and when the stimulus moved away I felt also a decided pressure in my thigh-muscles. Knowing what I do about the experiment, I am very careful not to read any movement into it. This definite movement of pursuit, however, quite surprised me; it was just as sharply automatic as the movement which one makes when his hat blows off. When the stimulus suddenly disappeared I suddenly felt myself in pursuit." "That's asafoetida! I liked it at first, and then it became U. Both were weak. I seemed to follow it at first and then, when it became U, I stopped." [He followed it and then jerked back.] "I felt muscular sensation in my head as I followed." "I felt like staying with that, keeping right after it."

H. "A general tendency to strain forward which was different from the other sort of expansive leaning." "Tendency to lean." "Tendency to react forward." "As it weakened there was a tendency to try to get more of the odor and there was a tendency to lean over. I must have leaned." "There seemed to be a bodily set of getting the odor; of going after the odor." "Thought I noticed an impulsion to get more of the experience."

Examples of line 5 (secondary movements) are:

D. "Relaxation of the head." "Relaxation of the neck." "Increase in saliva." "My shoulders raised with the inhalation." "Felt my trunk relax toward the stimulus." "Took long breaths to get all the sensation possible." "Tendency to take quick breaths." "Tendency to sit up towards the stimulus."

Bi. "Certain tendencies to keep on sniffing." "Just an easy relaxed kind of P." "One continuous uniform inhalation." "Just a free comfortable inhalation." "Pleasant relaxation all through the body. I had the relaxed, unrestrained breathing that comes with P." "Whole lot of sniffing movements. Kinaesthesia in the throat. Free nostrils." "A feeling in my face, as when I am just about to smile. These facial reactions were directly related to the P." "Bodily relaxation and comfortableness."

H. "A rather expansive tendency, that is, to throw the diaphragm down." "Slight tendency to deeper inhalation." "That same tendency to deeper, prolonged inhalation and rather more rapid expiration." "Certainly a muscular relaxing effect, very different from the experience one gets with U." "Seemed to be a tendency to get more of the odor." "Deep breathing. This sets up certain kinds of pressure in the abdominal region; not very strong in intensity. They have a lively something about them." "There seemed to be a tendency to a general muscular, I was going to say, relaxation, yet not in the sense of going flabby. The tonus of the muscles seems to stay rather high and yet not to constrict." "A peculiar muscular tendency in the direction of relaxation but with a fair degree of tonus." "There is an expansive effect different from relaxation, for there is still a high degree of muscular tonus, the muscles do not go flabby, there is a sort of brightness, a kind of glow to it." "There was muscular relaxation; I don't like that word 'relaxation' because the experience is as much a contraction as it is relaxation; perhaps a different set of muscles is involved. It may be characterized as 'expansive;' a 'glow.'" "There was certainly a muscular tendency both to relaxation and expansion (not going flabby). There is apparently a qualitative difference between the pressures when muscles contract and when they relax. There seemed to be an urge to get more of the stimulus." [E asked H to explain his statement about the muscles. H replied that contraction was correlated with U, it had a dull, uniformly intense nature. The experience was more or less definitely localized and definitely limited. Extension was correlated with P, and had a bright quality. It was more generally diffuse, was very indefinitely limited, and its intensity fluctuated within narrow limits.]

Examples of line 6 (organic stir) are:

D. "Made me feel hungry, empty feeling in my stomach." "It made pressure on the wall of the stomach." "I felt contraction of the stomach."

H. "There was a weak organic sensation in the region of the stomach, still there, diffuse, not definitely localized." "A bit of fleeting organic." "Slight pressure in the abdominal region." "Something like organic that eludes me all the time. Rather a bright-like pressure." "Weak organic something in stomach region, very indefinitely localized."

The Cutaneous Experiment. This experiment was conducted in the same manner as the Olfactory Experiment except that the first sentence of the instruction was made appropriate to the change in stimuli; in place of odors, five cutaneous stimuli were used. These stimuli were a draught of cool air, cold iron, a board containing fine sharp points, a board covered with sand-paper, and a board covered with soft fur. These were moved slowly across O's forehead or nose.

It will be noted from Table II that, although the series is short, H found decided movement or tendencies to movement with every P

experience; also that Bi again reported no organic stir with P. It will also be seen that what we have classified as secondary characteristics of P were less marked and primary characteristics were more marked in this than in the olfactory experiment. There was only one case reported of a change in respiration.

TABLE II

Observer	H	Bi	D
Total No. of Reports.....	16	13	10
Total No. of Reports classified as P.....	9	8	5
No. of P reports characterized by definite seeking movements or tendencies to movement.....	9	4	4
No. of P reports characterized by secondary seeking movements, such as expanding, change in breathing, changing from nose to whole cheek, etc.....	6	1	2
No. of P reports with organic stir.....	5	0	2
No. of P reports with gross observed movement	4	3	3

Examples of the kind of introspection that we have classified in line 4 of the table are:

D. "Tendency to follow the stimulus in order to keep it next to the neck."

Bi. "I did have a tendency to put my cheek on it and follow it."
"A little follow-up tendency."

H. "Then there was a positive muscular tendency forward."
"There was a tendency to lean forward a bit so that the sensation would be less of a ticklish sort, but a rubbing with a fair degree of pressure." "I did not realize how P it was until it was over. When the support was removed I toppled over." "Same tendency to lean toward the stimulus and to maintain movement." "The stimulus is more at your command here. It is there, you know it is there, and you can do with it what you want. Quite a low level of attention anyhow."

Examples of line 5 are:

D. "Organism seems to expand and to grow tall towards it."
"There was a tendency to take long breaths."

Bi. "I changed from nose to cheek."

H. "There was almost a tendency to lean and to expand upward."
"There was a muscular tendency of relaxation; it becomes almost a desire to maintain the experience."

Examples of line 6 are:

D. "There was a general feeling of P throughout the entire body."

H. "There was a general liveliness of pressure-quality, an expansive tendency in the abdominal region; the whole muscular system from the hips up was involved in it."

The Auditory Experiment. The same instruction was used in this experiment, except that the first sentence was again made appropriate to the change in stimuli.

Two adjoining rooms were used. In *E*'s room there was a large funnel-shaped horn. From the small end of this horn a 1.25 cm. rubber tube extended through double doors into *O*'s room. While one *E* operated the stimuli, a second *E* moved the free end of the tube gradually away from *O*'s ear.

The stimuli were: pleasing musical selections (victrola records); an unpleasant record made by causing the record to revolve from a point other than the center; chords and discords played on tuning forks; the scratching of the finger nail on sand paper; and the dropping of brass rings.

During the last half of this experiment the *O*'s were definitely instructed "voluntarily to inhibit any movement or tendencies to movement." The introspections marked * were taken from reports under this negative instruction. It will be noted from Table III that Bi reported marked tendencies to movement or actual movement in 14 out of 16 P cases; it is also interesting to note that here he reports two cases with organic stir.

TABLE III

Observer	H	Bi	D
Total No. of Reports.....	35	31	35
Total No. of Reports classified as P.....	22	16	28
No. of P reports characterized by definite seeking movements or tendencies to movement.....	15	14	15
No. of P reports characterized by secondary seeking movements, such as change in breathing, expansion, etc.....	17	6	23
No. of P reports with organic stir.....	12	2	15
No. of P reports with gross observed movement	12	8	12

Examples of the kind of introspection that we have classified in line 4 of the table are:

D. "Inclination to follow stimulus." * "Inclination to follow stimulus was repressed because of instruction." "There was a tendency to move the trunk in order to follow the stimulus as it moved in different directions, going away from me and then returning."

Bi. "There was pursuit from two causes, from P of the music itself, and from the effort to hear every note in order to identify the selection." "I felt strain in my neck as if I were following the tube backwards and upwards." "That was very P. The only U part was being compelled to pursue the tube in order to maintain the P experience." * "I found myself wishing that I could stretch out my ear. I am sure that my eyes turned in the direction of the stimulus two or three times. I am sure that I found myself starting to move." * "I could feel a pretty marked incipient tendency toward movement in order to hear the tone better." * "Once or twice there was a definite tendency to incline toward the door. This was when the music became weak." * "I had a great many ideas of movement of pursuit or tendencies to pursuit. Probably these were ideated movements and

are just pictorial of what I should have to do in order to follow the stimulus if actual movement were not inhibited."

H. "There was a special tendency to reach toward the stimulus when it became very weak." "The dying out of the tone brought an impulse to move head, this movement was noted after its beginning." "There was a muscular impulse to turn toward or adjust for the having of the experience." "I had an impulse to turn toward the sound source." * "There was a tendency to move my head which was corrected after the movement was made."

Examples of line 5 are:

D. "I took long breaths and relaxed." "There was a tingling in my finger tips. I closed my eyes." "I swayed." "There was a certain amount of rhythmical kinaesthesia." "There was a tendency to take deep inhalations. I always have this tendency with P."

Bi. "There was a tension in my neck of the kind that would turn my ear toward the tube." "There was a P kind of kinaesthesia." "Two or three times I found a tendency to rhythm."

H. "There was relaxation with slight expansion and deep easy breathing." "I breathed rhythmically." "There was an expansive tendency."

Examples of line 6 are:

D. "I experienced a sinking sensation in the pit of my stomach." "My organic system was very relaxed." "My stomach felt heavy."

Bi. "There was perhaps a slight organic 'stir' of P." "There was a kind of organic thrill."

H. "I experienced a diffuse quality that was bright and lively." "There was a diffuse bright pressure." "There was a diffuse expansive tendency in the abdominal region especially, but also in the body in general, a very weak bright-like pressure."

General Conclusions

We find that in 55.7% of the total number of cases classified as P all our O's reported definite movement or tendencies to move; while in 66.6% of the cases secondary reactions characteristic of pursuit or desire 'to maintain the experience' were also recorded. When we note that 28.6% of the cases reporting secondary seeking characteristics were found in P cases other than those classified in line 4, we therefore determine that definitely seeking or maintaining reactions to P stimulation are found in 84.3% of the total number of P cases; whereas Young found no direct involuntary tendencies to movement, or actual movement, reports only 11 cases of the secondary type, and classifies even these as voluntary.

The results obtained from our introspections are completely verified by the graphic records taken during the Olfactory Experiment. We noted, however, that the upward direction (with U-withdrawal) took place immediately, and was steeper than the downward direction. The lines correlated with P were of a gradually sloping nature. This result verifies Young's conclusion that the reaction to U is quicker and more intense than that to P. As the O's varied widely in the intensity of their reaction to the various stimuli, a quantitative statement of the amount of change would be inadequate. In general, the younger O's made more pronounced reaction to both U and P stimulation than the older. Since these reactions were entirely involuntary, there can be no doubt that they are characteristic of P, and were not occasioned by instruction or by laboratory predisposition.

In the case of taste, it is an everyday fact that the stimulus is ejected if U and retained if P. Young does not tell us the results of his chocolate-drop experiment.

It seems from our experiment that, if 'contraction' is a better term for describing the involuntary response to U, 'expansion' is a better term for describing the involuntary response to P. With intense U we found a definite withdrawal, and with weaker U a 'shrinking' of the organism, a desire 'to roll up into a ball,' a 'contraction,' a 'dull pressure quality,' etc. These organic tendencies all carried the meaning of withdrawal. Likewise on the side of P we found that there was either (1) actual pursuit or tendency to pursuit, if the stimulus was sufficiently intensive and there was danger of losing it; or (2), if the stimulus was weak or there was no danger of losing it, an expansion of the organism, a desire 'to get more of the experience,' 'to relax toward the stimulus,' 'to relaxation, yet with a rather high degree of muscular tonus,' etc. H has characterized his organic sensations as bright-like, lively, glowing. All these organic sensations carry the meaning of pursuit. In both P and U the intensity of the affective quality is an important determinant of the expression which the response will show.

We believe, therefore, that Young's results are derived from the particular situation under which he placed his O's. As they were seated throughout his experiment in a comfortable chair, they were already relaxed, and therefore it was easier for them to be 'passive and receptive' with P than with U stimuli. Their bodily comfort was a source of constant P stimulation, whereas our O's were indifferent to their position.

A second and more important criticism of Young's method is its inadequacy for producing P responses. If an O has a P stimulus placed under his nostrils, there is no incentive for him to make seeking movements, unless E begins to withdraw the stimulus. Indeed, when we repeated the Olfactory Experiment under Young's conditions and instructions, we found no definite seeking movements or tendencies to move; though the relaxation reported always had an expansive component.

There is no doubt that the most natural response to U is a movement of withdrawal. The direct response of the organism to P is, as stated above, either relaxation *with a certain degree of expansion*, if the stimulus is weak or stationary; or, if the stimulus is intense, and if the source of the P is withdrawn, a definite activity of pursuit or of tendencies to pursuit.